

## HORSESHOE KIDNEY RUPTURE

Oscar Heredero Zorzo, A. Palacios Hernandez, P. Eguiluz Lumbreras, M. Herrero Polo, V.R. Gomez Zancajo, M.A. Garcia Garcia, F.J. Diaz Alferéz and M. Urrutia Avisrrot.

Department and Chair of Urology. Salamanca University Clinic Hospital. Salamanca. Spain.

**Summary.-** *OBJECTIVE:* We report a rare case of horseshoe kidney trauma.

*METHODS:* 67 years old man with a horseshoe kidney, which presented a fracture of the isthmus after falling.

*RESULTS:* The diagnosis was made by IV contrast CT scan. He underwent exploratory laparotomy due to hemodynamic instability and radiologic findings on the CT scan.

*CONCLUSIONS:* The rupture of a horseshoe kidney is a rare injury. CT scan is the test of choice to classify the degree of injury. Depending on the patient's hemodynamic stability and the findings on the CT scan the options are conservative or immediate surgical treatment.

**Keywords:** Horseshoe kidney. Trauma.

**Resumen.-** *OBJETIVO:* Presentamos un caso infrecuente de rotura de riñón en herradura.

*MÉTODOS:* Se aporta el caso de un varón de 67 años con riñón en herradura, que presentó una fractura del istmo renal tras caída.

*RESULTADOS:* El diagnóstico se realizó por TAC abdomino-pélvico con contraste. Se sometió a laparotomía exploradora debido a la inestabilidad hemodinámica del paciente y a las características radiológicas del TAC.

*CONCLUSIONES:* La rotura de riñón en herradura es una lesión infrecuente. El TAC abdomino-pélvico es la prueba de elección para clasificar el grado de lesión. Dependiendo de la estabilidad hemodinámica del paciente y de los hallazgos encontrados en el TAC se optará por tratamiento conservador o quirúrgico inmediato.

**Palabras clave:** Riñón en herradura. Traumatismo.

## INTRODUCTION

Horseshoe kidney is a congenital disorder of the kidney, caused by the fusion of the lower poles in both kidneys before their rotation around their axis, between weeks 4 and 6 of pregnancy, so that they are joined by an isthmus, which can be fibrous or parenchymatous (1). These anomalous kidneys keep a normal function, although they present some anatomical alterations with regard to their vascularization and their excretory pathway.

It appears in 1 of every 400 people, it is more common in males (ratio 2:1), and it is sometimes associated to other congenital disorders (2,3). Approximately 60% of the cases are asymptomatic, and their diagnosis is the consequence of a chance finding during the study of other pathologies. In the rest of the cases, the most common symptoms are episodes of recurring lithiasis, UTI or hydronephrosis secondary to obstruction in the pyeloureteral area (3).

With regard to the lesions that are a consequence of traumas of the renal parenchyma and the excretory pathway, it should be noted that they appear in approximately 10% of all polytraumatized patients (4). These lesions are more common in males during the 3<sup>rd</sup> and 4<sup>th</sup>



## CORRESPONDENCE

Oscar Heredero Zorzo  
Obispo Barbado Viejo, 17 - 3<sup>o</sup>A  
37001 Salamanca (Spain).

oscarheredero@hotmail.com

Accepted for publication: 31<sup>th</sup> March, 2008.

decades of life. The increase of traffic accident during the last 10 years, as well as the industrial and sport accidents and the increasing violence have placed renal traumas into an interesting place regarding the frequency of serious lesions. The main aspect in the assessment of these patients is the early detection of the lesion, in order to prescribe a treatment that will be as conservative as possible, with the maintenance of the renal function as its main goal.

We present the case of a male patient of 67 years of age, diagnosed with multiple rupture of horseshoe kidney in the study of a traumatism in the lumbar region.

## CASE REPORT

Male patient of 67 years of age, with no relevant personal record. On the 18th September 2007 at 8:00 p.m., he has a fall in the street, injuring the lumbar region. He consults with his primary care practitioner for lumbar pain, which increases with flexo-extension of the legs. He is prescribed analgesics and domiciliary care. Two hours later, we receive a call from his domicile, in which he reports macroscopic hematuria and intense abdominal pain. He presents pain on abdominal palpation with signs of peritoneal inflammation, blood pressure of 110/70 and paleness of skin and mucus. He is admitted in the University Hospital of Salamanca for an assessment.

At the time of his admission as an emergency (around 11:00 p.m.), the patient presents a clear abdominal guarding, with a pressure of 135/85, heart rate of 94 bpm and present pulses. The rest of the physical exploration revealed no significant findings. An ECG shows

an auricular fibrillation that had not been found before. The analysis reveals hemoglobin values of 12.8 g/dl and prothrombin time of 69% as the most significant findings. An emergency abdominal CT with contrast is performed, showing a horseshoe kidney with rupture in the central and left medial areas, with a great retroperitoneal hematoma, with active extravasation of contrast next to the renal fracture. Other structures were unaffected (Figure 1).

In view of these findings and the clinical state of the patient, an exploratory laparotomy is performed, revealing a great hemoretroperitoneum that affects the root of the mesentery, as a consequence of a multiple rupture in the left hemi-kidney, which affects the intrarenal pathway (grade IV of the organ injury scale of the American Association for the Surgery of Trauma) (5). The retroperitoneal hematoma is removed, and a nephrectomy of the left hemi-kidney is performed. During the operation, the patient remains stable, and he receives the transfusion of 2 units of erythrocyte concentrate.

During the immediate postoperative period, the patient remains hemodynamically stable, with hemoglobin levels around 10 g/dl, slight febricula, a certain abdominal distension and low peristalsis. The abdominal CT, performed on the 23<sup>rd</sup> September 2007, showed a renal accumulation of approximately 1 cm, and active monitoring was suggested (Figure 2).

## DISCUSSION

The incidence of horseshoe kidney in the general population is 0.25% (1). Two etiopathogenic theories have been suggested as an explanation for this congenital

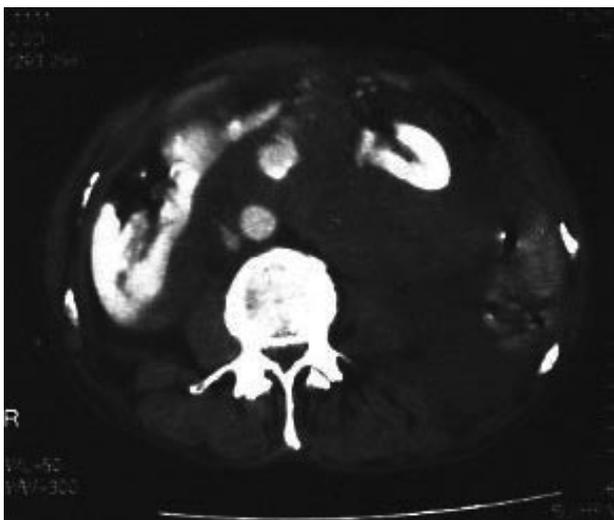


FIGURE 1. Rupture of the isthmus of the horseshoe kidney.

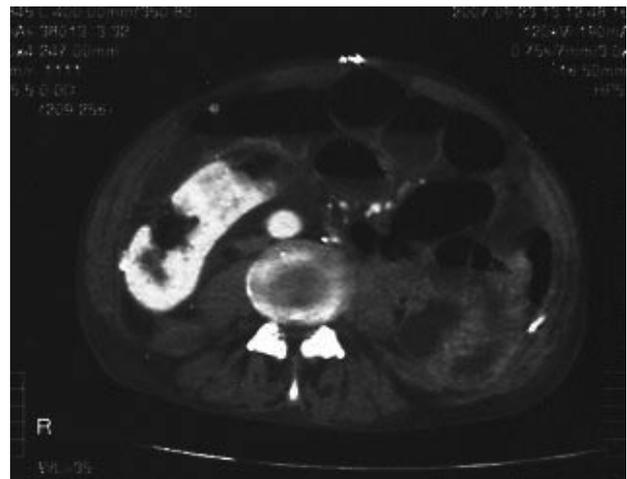


FIGURE 2. Accumulation in the renal isthmus.

fusion disorder, depending on the tissue of the isthmus: the mechanical theory states that the lower poles of the metanephric masses are fused after the implantation of the ureteral bud, and the isthmus is thus made of fibrous tissue (1). The teratogenic theory suggests that there is a process of abnormal migration of the posterior nephrogenic cells that are joined for the creation of the isthmus, which would be made of parenchymatous tissue.

The teratogenic theory is able to explain the association between horseshoe kidney and other congenital disorders related to the urogenital system, such as pyeloureteral stenosis, cryptorchidism, vesicoureteral reflux, ureteral duplicity and hypospadias in men, and bicornuate uterus in women, as well as bone disorders, myelomeningocele, cardiovascular disorders such as interventricular communication, and genetic syndromes such as Turner syndrome or trisomy 18 (3,6).

This disorder is associated with a higher probability of developing tumoral infections (Wilms tumor) and traumatic processes, due to its location, anatomy, and the variability of its vascularization. Traumatic lesions in a horseshoe kidney are uncommon. Several authors describe them in the context of a closed abdominal trauma (1,2,7). However, that is not the case in abdominal lesions due to attacks with knives (3).

In the event of a closed abdominal traumatism, as a consequence of the lower anatomic location of the kidney, which is not protected by the floating ribs and is located before the lumbar vertebrae, there is an increased risk of rupture by compression or fracture of the isthmus against the spinal column (1,2,7).

Contrast-enhanced CT is confirmed as the radiological test of choice in hemodynamically stable patients with the following symptoms: macroscopic hematuria, microscopic hematuria associated with systolic arterial pressure <90 mmHg or peritoneal washing with a positive diagnosis (8). It is the best method for a proper classification of the seriousness of the renal lesion, the presence of urinary extravasation, vascular lesions and perirenal hemorrhages. It makes it possible to diagnose unforeseen structural disorders, such as horseshoe kidney, as well as the structure of its vascularization in order to carry out a possible surgical approach (7,8).

A conservative approach in the treatment of closed renal traumatism in grade IV lesions (5) is the option of choice for some authors, because the loss of blood and renal parenchyma, together with the need for open surgery are lower with a conservative treatment or with delayed surgery than with immediate open surgery (8). In our case, in view of the hemodynamic instability of the patient and the CT findings, we chose to perform an emergency exploratory laparotomy, which revealed a parenchymatous rupture of the renal isthmus.

## CONCLUSION

The rupture of a horseshoe kidney is an uncommon lesion. The abdomino-pelvic CT is the test of choice for the classification of the grade of the lesion. According to the hemodynamic stability of the patient and the CT findings, a conservative or an immediate surgical treatment will be chosen.

## REFERENCES AND RECOMENDED READINGS

(\*of special interest, \*\*of outstanding interest)

1. Murphy JT, Borman KR, Davidson I. Renal auto-transplantation after horseshoe kidney injury: a case report and literature review. *J Trauma* 1996; 40:840-44.
2. Allen RC. Horseshoe kidney. (Artículo electrónico. Última revisión: 14/10/04. Disponible en <http://www.emedicine.com/med/topic2860.htm>).
3. Toval-Mata JA, Fernández-Rodríguez A, Pichardo-Pichardo S et al. Traumatismo abdominal por arma blanca con afectación de riñón en herradura. *Cir Esp* 2006; 79:123-25.
4. Friedland GU, Filly R, Goris ML, et al. Injuries. In: *Uroradiology: an integrated approach*. New York: Churchill Livingstone 641, 1983
5. Moore EE, Shackford SR, Pachter HL et al. Organ injury scaling—spleen, liver and kidney. *J Trauma* 1989; 29:1664-66.
- \*\*6. Soto M, Bachiller J, Rodríguez-Rubio RI, Rodríguez-Rubio F. Contribución al estudio del riñón en herradura. Formación continuada en Urología. Volumen 5. N°2 Pulso Ediciones S.A.,1999.
7. Aubert J, Grange P, Dore B. Contusion on horseshoe kidney. A propos of 2 cases. *J Urol* 1987; 93:455-61.
- \*8. Pascual Samaniego M, Bravo Fernández I, Ruiz Serrano M et al. Rotura traumática de riñón en herradura. *Actas Urol Esp* 2006; 30:424-28.
9. Ramírez Fabián M, Vicente Aldea MT, Ucar Terren A et al. Cirugía del aneurisma de aorta abdominal en presencia de riñón en herradura, a propósito de un caso y revisión de la literatura. *Arch Esp Urol* 1999; 52:1.087-89.
10. Valero Puerta JA, Jiménez Gonzalo FJ, Medina Pérez M et al. Poliglobulia e hidronefrosis, en riñón en herradura. *Arch Esp Urol* 1999; 52:662-74.